



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/773,733

02/05/2004

Kyung-Ho Yoon

04-156

8603

34704 7590 06/09/2009

BACHMAN & LAPOINTE, P.C.
900 CHAPEL STREET
SUITE 1201
NEW HAVEN, CT 06510

EXAMINER

MONDT, JOHANNES P

ART UNIT

PAPER NUMBER

3663

MAIL DATE

DELIVERY MODE

06/09/2009

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/773,733	Applicant(s) YOON ET AL.	
	Examiner JOHANNES MONDT	Art Unit 3663	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 26 May 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 10-26 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 10-26 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>1 Form PTO-1449</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 5/26/09 has been entered.

Information Disclosure Statement

2. The examiner has considered the items listed in the Information Disclosure Statement filed 5/26/09. A signed copy of Form PTO-1449 is herewith enclosed.

Response to Amendment

3. Amendment filed on 5/26/09 with said request for Continued Examination forms the basis for this Office action. In said Amendment applicants substantially amended claims 10-20 and added new claims 21-26, including two independent claims 21 and 25. Comments on Remarks submitted with said Amendment are included below under "Response to Arguments".

Claim Objections

4. On objection to claim 19: although the problem indeed arises upon allowance, the objection under Applicant is advised that should claim 16 be found allowable, claim 19 will be objected to under 37 CFR 1.75 as being a substantial duplicate thereof. When two claims in an application are duplicates or else are so close in content that

Art Unit: 3663

they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k).

Claim Rejections - 35 USC § 112

5. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

6. ***Claims 10-20*** are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claims contain subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventors, at the time the application was filed, had possession of the claimed invention. The limitation “two spaced inner support parts extending vertically in the opening between the top and bottom edges of the opening” (lines 28-30 of independent claim 15) fails to have written support in the specification. Of the inner support parts as defined in the specification (numeral 21, see Figure 6 and paragraph [0035] of the original specification) only one is extended vertically in the opening, the other is extended horizontally in the opening. Therefore, the limitation constitutes new matter.

7. ***Claim 20*** is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had

Art Unit: 3663

possession of the claimed invention. In particular the claimed spacing of the spaced inner support parts from the side edges of the opening is not supported by the written description and hence constitutes new matter.

8. **Claims 21-24** are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claims contain subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventors, at the time the application was filed, had possession of the claimed invention. The limitation “two spaced inner support parts extending vertically in the opening between the top and bottom edges of the opening” (lines 28-30 of independent claim 21) fails to have written support in the specification. Of the inner support parts as defined in the specification (numeral 21, see Figure 6 and paragraph [0035] of the original specification) only one is extended vertically in the opening, the other is extended horizontally in the opening. Therefore, the limitation constitutes new matter.

9. **Claims 25-26** are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claims contain subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventors, at the time the application was filed, had possession of the claimed invention. The limitation “two spaced inner support parts extending vertically in the opening between the top and bottom edges of the opening” (lines 28-30 of independent claim 25) fails to have written support in the specification. Of the inner support parts as defined in the specification (numeral 21, see Figure 6 and

Art Unit: 3663

paragraph [0035] of the original specification) only one is extended vertically in the opening, the other is extended horizontally in the opening. Therefore, the limitation constitutes new matter.

10. **Claim 22** is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventors, at the time the application was filed, had possession of the claimed invention. The limitation “wherein the guide vanes are shaped differently from the guide taps” is not supported by a written description in the original specification. Only the shape of the guide vanes is described in the bulk of the specification (see paragraph [0034]) while with regard to the original claim language it is noted that the different descriptions of the shapes of guide vanes and guide taps (claims 5 and 6) are not at all mutually exclusive. The Drawings provided insufficient evidence to conclude difference in shape as claimed. Therefore, said limitation constitutes new matter.

11. **Claim 23** is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventors, at the time the application was filed, had possession of the claimed invention. The limitation “wherein the mixing blades are shaped differently from the guide vanes and the guide taps” is not supported by a written description in the original specification. Only the shape of the guide vanes is

Art Unit: 3663

described in the bulk of the specification (see paragraph [0034]), no original claim delineates mixing blade shape, and the Drawings provide insufficient evidence to conclude shape difference. Therefore, the limitation constitutes new matter.

12. **Claim 24** is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventors, at the time the application was filed, had possession of the claimed invention. The limitation “wherein the guide taps defined along the perimeter strips have an arch-shaped edge with no point, and wherein the guide vanes extend to a point” is not supported by a written description in the original specification. Assuming a point cusp is meant with “point” the guide vanes are disclosed to be rounded, hence have no “point” and they are arc-shaped; however, the guide vanes are not disclosed to ‘extend to a point’, when assumed this means “have a point-cusp”., and in fact, according to original claim 6, each of the guide taps is rounded, hence does not extend to a point. Therefore, the limitation constitutes new matter.

13. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

14. **Claims 10-20** are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The metes and bounds of the claimed invention are

Art Unit: 3663

vague and ill-defined due to the lack of support by a written description due to the introduction of new matter: see section 6 above.

15. **Claim 20** is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The metes and bounds of the claimed invention are vague and ill-defined due to the lack of support by a written description due to the introduction of new matter: see section 7 above.

16. **Claims 21-24** are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The metes and bounds of the claimed invention are vague and ill-defined due to the lack of support by a written description due to the introduction of new matter: see section 8 above.

17. **Claims 25-26** are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The metes and bounds of the claimed invention are vague and ill-defined due to the lack of support by a written description due to the introduction of new matter: see section 9 above.

18. **Claim 22** is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The metes and bounds of the claimed invention are vague and ill-defined due to the lack of support by a written description due to the introduction of new matter: see section 10 above.

Art Unit: 3663

19. **Claim 23** is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The metes and bounds of the claimed invention are vague and ill-defined due to the lack of support by a written description due to the introduction of new matter: see section 11 above.

20. **Claim 24** is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The metes and bounds of the claimed invention are vague and ill-defined due to the lack of support by a written description due to the introduction of new matter: see section 12 above.

Claim Rejections - 35 USC § 103

21. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

22. **Claims 10, 15, 17 and 18** are rejected under 35 U.S.C. 103(a) as being unpatentable over Oyama et al (US 5,303,272), in view of Yoon et al (US 20030012329 A1) .

Oyama et al teach a spacer grid capable of being used to place and support a plurality of longitudinal fuel rods in a nuclear reactor fuel assembly, comprising of:

Art Unit: 3663

a plurality of inner strips 7b (col. 3, l. 15 and col. 1, l. 23-30) intersecting each other to form a plurality of guide tube cells 3 (col. 1, l. 15-22) capable of receiving guide tubes (such a control rods) therein, and a plurality of fuel rod cells 5 (col. 5, l. 51-53) capable of receiving fuel rods 6 (col. 1, l. 33-37) therein, with a plurality of mixing blades (projecting upward from the top at intersections of inner strips 7b one of which is represented in Figure 11) projecting upward from the inner strips 7b at intersections of the inner strips (loc.cit.); and

a plurality of perimeter strips 7a (Figure 10, col. 3, l. 10-12 and col. 1, l. 23-30) each of which comprises a plurality of unit strips (Figures 8 and 10) including intermediate unit strips and corner unit strips by virtue of forming a matrix of grid cells with rank > 2 as shown in Figure 8, the perimeter strips encircling the inner strips by virtue of forming a closed perimeter as shown by Figure 8, and the corner unit strips forming outermost corner cells of the spacer grids (loc.cit.), with a grid spring 10a (col. 1, l. 35) provided on each of the unit strips (Figure 10 and col. 1, l. 30-37), the grid spring comprising:

a vertical opening 11 (col. 1, l. 38-39) formed at a central area of each of the unit strips (Figure 10);

a vertical support part extending vertically in the vertical opening 11 from central portions of top and bottom edges of the vertical opening ('vertical support part' being met by the union of two elongated members each with single straight horizontal line bent and connected to each other through a central member: see Figure 10); and

a fuel rod support part provided at a central portion of the vertical support part (met by the aforementioned central member: see Figure 10),

further comprising

inner grid springs 10b on the inner strips 7b (see Figure 11 and col. 1, l. 30-37 and col. 3, l. 13-16), wherein the inner grid springs comprise an inner support part extending between edges of said inner grid springs (met by lateral flanks abutting 7b: see Figure 11), and an inner fuel rod support part provided on the inner support part (met by a central portion abutting laterally both flanks (see Figure 11), wherein the vertical support part and the inner support part are different in structure, geometry (the further limitation of claim 17 is thus also met) and shape (thus the further limitation of claim 18 is also met), because, unlike the vertical support part, the inner support part does not feature aforementioned straight *horizontal line bents* (juxtapose Figures 10 and 11): said straight line bents imply a different structure, geometry, because the structure with said bents is non-planar rather than planar, which is difference in structure, geometry and shape (shape relevant to claims 21 and 25, see below for rejection of claim 21 and claim 25).

It is, with regard to the most recent amendments, noted that

(A) the primary reference Oyama et al do disclose bending lines of the inner fuel rod support part identified in the previous office action as the central part of the inner grid springs 10b, although they are not horizontal. See Figure 11.

(B) Oyama et al disclose two inner support parts flanking said central part from below and above (Figure 11), while the above rejection cites Yoon et al for the specific embodiment of the inner grid spring's enlarged contact area, with especial reference to Figure 7, in which Yoon et al disclose an embodiment of fuel rod support excelling in an enlarged contact area. In their embodiment of Figure 7, the limitation "two spaced inner support parts 38 extending vertically in the opening 30 between the top and bottom edges of the opening, and an inner fuel rod support part 50 extending transversely between the two spaced inner support parts" (the latter, in current claim language, met by parts 38 flanking 36 from below and above) is met. At the very least the claim limitation is obvious as nothing more than "combining prior art elements according to known methods to yield predictable results" is involved in arriving at the invention, While motivation is found in the resulting enhanced contact area for enlarging the vertical extent of the inner grid springs 10b in Oyama et al following Yoon et al.

Oyama et al do not teach the limitations

- a. "the fuel rod support part being bent to have equiangular surface contact with a fuel rod supported by the grid spring"; nor
- b. "the inner fuel rod support part being bent to have equiangular surface contact with a fuel rod support by the grid spring"; nor
- c. "the inner grid springs comprise an opening formed in the inner strips".

However, it would have been obvious to include limitations ad a and b in view of Yoon et al, who, in a patent application publication drawn to a spacer with grid springs for a

Art Unit: 3663

nuclear fuel assembly (title, abstract), hence analogous art, teach conformal contact and enlarged elastic range (loc.cit.) through shaping an equiangular surface 45 of fuel rod support parts 50 both for inner and outer unit strips 15 of grid springs 20 (see [0062] and [0070]-[0071]) so as to have enlarged contact area and uniform contact distribution and consequent reduction of peak (mechanical) stress (see [0070]-[0071]). *Motivation* to include the teaching by Yoon in the regard derives immediately from the accomplished reduction in peak stress exerted on the fuel rods as explicitly taught by Yoon et al ([0070]-[0071]).

Furthermore, it would have been obvious to include limitation ad c as well in view of Yoon et al, because they teach the inner grid springs 20 to comprise an opening 30 in the inner strips 15 (see [0070] and Figure 7). One of ordinary skill in the art would have deemed it obvious to thereby further improve the capability of the inner support parts (36 and 38 in Yoon et al) to absorb the force transmitted from the fuel rod support part as specifically indicated by Yoon et al to be the objective of their design (see [0076]). The claim would further have been obvious in this regard (ad c) because the technique for improving a particular class of devices such as those taught by Oyama et al, was part of the ordinary capabilities of a person of ordinary skill in the art, in view of the teaching of the technique for improvement in other situations such as those taught by Yoon et al. High level of predictability of success is insured because the formation of grid springs comprising openings in straps has long been recognized as a reliable form of manufacture, considering Yoon et al.

On claim 10: as already discussed *supra*, the vertical support part in Oyama et al is bent at two steps (above and below the fuel rod support part) along substantially horizontal bending lines (see discussion of claim 15 above), and after implementation of the teaching by Yoon et al the fuel rod support part is equiangular with the fuel rods (see [0062]-[0071] and Figure 9(a), e.g.).

23. **Claims 16 and 19** are rejected under 35 U.S.C. 103(a) as being unpatentable over Oyama et al and Yoon et al as applied to claim 15 above, and further in view of Mayet et al (US 6,542,567 B1) (previously cited) and Foulds et al (US 3,966,550) (previously cited).

As detailed above, claim 15 is unpatentable over Oyama et al in view of Yoon et al. Neither reference necessarily teaches the further limitation of higher or greater spring strength of the vertical support part than the inner support part as defined by claim 16, or higher spring constant as recited in claim 19, where reference is made to the objection to claim 19 on account of being an essential duplicate of claim 16. However, it would have been obvious to include said further limitations in view of

(a) Mayet et al, who teach to use Zircaloy for the material embodiment of the straps including springs in those regions with the higher neutron flux (col. 1, l. 23-27) (examiner takes official notice that Zircaloy excels through low neutron cross section, whence the preference for Zircaloy under high neutron flux; see also DeMario (*loc.cit.*), col. 7, l. 10-16), while on the other hand it is known that the mechanical strength of Zircaloy diminishes rapidly due to neutron irradiation (see Mayet et al, *loc.cit.*) thus making it less preferable in the edge region where neutron flux is lower than in the

Art Unit: 3663

center of the spacer grid; it would hence have been obvious to use a viable alternative for Zircaloy in the edge region, such as steel in view of

(b) Foulds (col. 9, l. 61- col. 10, l. 8) for which the recommended spring constant exceeds that for Zircaloy.

Motivation to include the teaching by Mayet et al and Foulds et al in the invention by Oyama et al as modified by Yoon et al derives from the advantage to reduce neutron loss by using Zircaloy while preventing mechanical deterioration of the springs where an alternative such as steel is acceptable because of reduced neutron flux.

24. **Claims 11-12** are rejected under 35 U.S.C. 103(a) as being unpatentable over Oyama et al and Yoon et al as applied to claim 15 above, and further in view of Oh et al (6,393,087 B1) (previously cited) and De Mario et al (5,303,276) (previously made of record).

On claim 11: As detailed above, claim 15 is unpatentable over Oyama et al in view of Yoon et al. Neither Oyama et al nor Yoon et al necessarily teach the entire limitation defined by claim 11. However, it is noted that Oyama et al do teach each of the *peripheral* unit strips to have a coolant flow guide vane (see protrusions at the top portions of outer straps 7a in Fig. 10). However, it would have been obvious to include both a coolant flow guide vane and a guide tap in view of Oh et al, who, in a patent on a spacer grid for a nuclear fuel assembly (see title and abstract), hence analogous art, teach that each of the intermediate unit strips has a coolant flow guide vane 30 (i.e., longer one of two structures 30 shown in the upper portion of Figure 9) and a guide tap

Art Unit: 3663

(shorter one of two structures 30 shown in an upper portion of Figure 9) on an upper edge thereof (col. 7, l. 1-14 and Figure 9) such that a plurality of coolant flow guide vanes and a plurality of guide taps are alternately arranged (col. 7, l. 33-39) along an upper edge of each of the intermediate unit strips (loc.cit. and Figure 14 and col. 7, l. 15-24) for the purpose of enhancing mixing of the coolant fluid. The claim limitation would have been obvious because coolant mixing enhances coolant efficiency, as well known in all heat exchange art including the nuclear reactor cooling art. The claim would have been obvious because the technique for improving a particular class of devices such as taught by Oyama et al was part of the ordinary capabilities of a person of ordinary skill in the art, in view of the teaching of the technique for improvement in other situations as exemplified by Oh et al. See MPEP 2141.

Even Oh et al do not necessarily teach the further limitation that “each of the corner unit strips having either a coolant flow guide vane or guide tap on an upper edge thereof to complete an alternate arrangement of the coolant flow guide vanes and guide taps”.

However, it would have been obvious to include said further limitation in view of De Mario et al, who teach upper and lower edges of the perimeter strips, and hence also of corner unit strips to have guide/protective/flow taps or vanes of different geometric dimensions bent inwardly in an alternating arrangement (Figure 3 in De Mario et al; see vanes over 320 and col. 8, l. 16-28), incorporation of the teaching in this regard by Mario et al thus completing an alternate arrangement of coolant flow guide vanes and guide taps in cooperation with the intermediate unit strips. *Motivation* to include the teaching by Mario et al in the invention by Oyama et al derives immediately from the

Art Unit: 3663

noted advantage by De Mario et al that the inventive arrangement by De Mario et al succeeds in providing single-phase coolant flow distributed over each fuel rod even at high heat flux (col. 5, l. 19-24).

On claim 12: Furthermore, although neither Oyama et al nor Yoon et al nor Oh et al necessarily teach the further limitation as defined by claim 12, it would have been obvious to include said further limitation in view of De Mario et al, who teach each of the intermediate cells walls to have downwardly projecting guide taps (downward protrusions thereof as shown in Figure 3) at both corners (i.e., at both the left and right corner adjacent lattice members 310 of each intermediate unit strips and each of the plurality of corner unit strips has a guide tap projecting downward on a lower edge of each of the corner unit strips (see element 330 in Figure 3 of De Mario and col. 8, l. 28-34). Motivation to include the teaching by Mario et al in the invention by Oh et al derives immediately from the noted advantage by De Mario et al that the inventive arrangement by De Mario et al succeeds in providing single-phase coolant flow distributed over each fuel rod even at high heat flux (col. 5, l. 19-24).

25. **Claim 13** is rejected under 35 U.S.C. 103(a) as being unpatentable over Oyama et al, Yoon et al, Oh et al and De Mario et al as applied to claim 11 above, and further in view of Delafosse et al (4,224,107) (previously made of record).

As detailed above, claim 11 is unpatentable over Oyama et al in view of Yoon et al, Oh et al and De Mario et al. Furthermore, each of the coolant (flow guide) vanes in the reference most pertinent on guide vanes among the aforementioned reference, i.e., Oh et al, are bent toward a center of the spacer grid because each of said coolant vanes is

Art Unit: 3663

shown, and in order to cause a swirl of the coolant fluid: must be, bent in two orthogonal directions so as to cause a swirl, i.e., a rotation of the fluid (see Figures 8 and 9 and col. 7, l. 1-68). Said two directions span a plane. The vector connecting each coolant flow guide vane with a center of said spacer grid toward a center of the spacer grid (as opposed to *the* center of said spacer grid (the latter may not even exist, in the case when the number of cells in either a row or a column is even), as any center of any element qualifies to be a center of said spacer grid). Furthermore, it is noted that Oh et al teach elements 30 to be “bent towards the center of the main flow path” (col. 7, l. 1-14), which center, when said flow path is taken as a whole, is substantially identical to the center in a horizontal cross section of the spacer grid. Oh et al also show a width of each of said guide vanes reducing from a position at which each of said guide vanes is initially bent (see Figure 6), showing a tapered shape (loc.cit.).

Oh et al do not necessarily teach the further limitation that a peak of each of the guide vanes to be rounded. However, they do indicate that its specific shape is a matter of design choice because said shape can be chosen “in accordance with a desired swirl flow” (col. 7, l. 44-49). Furthermore, it would have been obvious to include said further limitation in view of Delafosse et al, who teach the rounding of protrusions 9 over unit strips 2 and 3 (hence structurally analogous to protrusions 30 of Oh et al), where the rounding is to as to avoid jamming (col. 3, l. 12-20). Motivation to include the teaching by Delafosse et al immediately derives from the advantage of the avoidance of jamming.

Art Unit: 3663

26. **Claim 14** is rejected under 35 U.S.C. 103(a) as being unpatentable over Oyama et al, Yoon et al, Oh et al and DeMario et al as applied to claim 11 above, and further in view of Nguyen et al (6,526,116 B1) (previously made of record).

As detailed above, claim 11 is unpatentable over Oyama et al, in view of Yoon et al, Oh et al and DeMario et al. Although neither of the two references most pertinent to the features of guide vanes and guide taps, Oh et al nor DeMario et al, necessarily teach the further limitation defined by claim 14, it would have been obvious to include said further limitation in view of Nguyen et al, who, in a patent on nuclear fuel assemblies with spacer grid ("support grid", see abstract, first sentence) and mixing vanes (loc.cit.), hence analogous art, teach each guide tap 32 to be bent in two lateral directions orthogonal to each other, hence also in the direction towards the center of the spacer grid (col. 5, l. 10-43, and Figures 1 and 2). Motivation to include the teaching by Nguyen et al in the invention derives from the resultant balance of hydraulic forces across the center of the grid (see abstract in Nguyen), which balance is beneficial to any spacer grid of a nuclear fuel assembly as in its absence the structure is unstable on account of force imbalance.

27. **Claim 21** is rejected under 35 U.S.C. 103(a) as being unpatentable over Oyama et al (US 5,303,272), in view of Yoon et al (US 20030012329 A1) , Oh et al (6,393,087 B1) (previously cited), De Mario et al (5,303,276) (previously made of record), Nguyen et al (6,526,116 B1) (previously made of record), Mayet et al (US 6,542,567 B1) (previously cited) and Foulds et al (US 3,966,550) (previously cited). The claim is essentially identical to a straightforward combination of claims 15, 11, 12, 14 and 16,

Art Unit: 3663

but with the limitation that the vertical support part and the two spaced inner support parts are different in shape, which has already been discussed in the rejection of independent claim 15, which discussion is herewith included by reference. Examiner also includes by reference the text of the rejections of claims 15, 11, 12, 14 and 16 in their totality.

Response to Arguments

28. Applicant's arguments filed 5/26/09 have been fully considered but they are not persuasive.

a. On IDS: Examiner has considered the items listed in the IDS: see signed copy of Form 1449.

b. On objection to claim 19: although the problem indeed arises upon allowance, the objection under Applicant is advised that should claim 16 be found allowable, claim 19 will be objected to under 37 CFR 1.75 as being a substantial duplicate thereof. When two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k). On the substance of the matter applicants do not provide any substantive argument in traverse, but merely state they do not concede the claims to be substantial

Art Unit: 3663

duplicates, but without a reasoned statement. Therefore, the objection is restated as a warning but is otherwise maintained.

c. On the rejection of claims 10, 15, 17, 18 and 20 under 35 USC 103(a):

c.1: Applicant appears to rely on the newly introduced feature of two steps along vertical bending lines of the inner rod support part (22) (see page 11 of Remarks). However, note that the primary reference Oyama et al do disclose bending lines of the inner fuel rod support part identified in the previous office action as the central part of the inner grid springs 10b, although they are not horizontal. See Figure 11. Therefore, the amendment does not overcome the rejection over the prior art of record based on this feature.

c.2: Applicants further allege (page 12) that the two spaced vertical support parts 21 are not in the prior art of record. However, as clearly may be seen from the same discussion of Figure 11, Oyama et al disclose two inner support parts flanking said central part from below and above (Figure 11), while the Office action had cited Yoon et al for the specific embodiment of the inner grid spring's enlarged contact area, with especial reference to Figure 7, in which Yoon et al disclose an embodiment of fuel rod support excelling in an enlarged contact area. In their embodiment of Figure 7, the limitation "two spaced inner support parts 38 extending vertically in the opening 30 between the top and bottom edges of the opening, and an inner fuel rod support part 50 extending transversely between the two spaced inner support parts" (the latter, in current claim

Art Unit: 3663

language, met by parts 38 flanking 36 from below and above) is met. At the very least the claim limitation is obvious as nothing more than “combining prior art elements according to known methods to yield predictable results” is involved in arriving at the invention, While motivation is found in the resulting enhanced contact area for enlarging the vertical extent of the inner grid springs 10b in Oyama et al following Yoon et al.

c.3: With respect to claims 16 and 19, applicant is reminded that (a) spring strength and spring constant go together, and applicants never even bother to mention “spring constant” in their original specification, which determines how strong the spring is. Now, with applicants’ arguments “spring constant” is new matter (see 35 USC 112, 1st par., above); (b) when a rejection has been provided it is applicants’ task to traverse the rejection if applicant is so inclined, and, as stated in 37 C.F.R. 1.111(a) the reply by the applicant or patent owner must be reduced to a writing which distinctly and specifically points out the supposed errors in the examiner’s action and must reply to every ground of objection and rejection in the prior Office action. The reply must present arguments pointing out the specific distinctions believed to render the claims, including any newly presented claims, patentable over any applied references. Applicants have not raised any distinct and specific points in traverse. Applicants introduce “spring strength” in the specification as a term in the art “the spring strength”, i.e., without explicit definition. The

Art Unit: 3663

"spring constant" or "force constant" is "the ratio of force to displacement in elastic material" (see Academic Press, 1992), and as such defines the spring's strength. Therefore, applicants' arguments are not persuasive.

c.4: Applicants' argument in traverse of claims 11-12 and 14 (page 13) does not at all address limitations in the claim language: applicant's dismissal of guide tap by Oh et al is misplaced because the guide tap in the specification is the shorter one of guide vane and guide tap and is not distinguished in structure from the guide tap of Oh et al. Applicants' argument appears to depend on intended use "...for reducing interference...." (page 13) which as a limitation cannot even be found in the claims, And which, when claimed would not distinguish from the structure as found in Oh et al. Similarly, applicants' traverse of the citations of DeMario et al and Nguyen rely solely and without any explanation on intended use. Finally, applicants' argument alleging the absence of teaching in the prior art as cited of coolant flow guide vanes and guide taps alternately arranged as claimed does not address the specific citation, referring to the teaching of Oh et al of guide vanes 30 (hence both guide vanes and guide taps) as follows:

"Since each of the vanes 30 is bent outwardly, the vanes 30 are almost completely free from being undesirably brought into contact with the fuel rods 6. In addition, the swirling directions of the vanes 30 provided at the main flow paths 7 of the grid 2 are designed as follows. That is, the swirl flow vanes

Art Unit: 3663

30, provided at the main flow paths 7 on a perpendicular arrangement, are designed in that their swirling directions are opposite to each other”.

See Figure 10 and col. 7, l. 3-39, in Oh et al, as cited previously.

Since the objective of the guide vanes is a swirling effect the orientations necessarily alternate along any perpendicular column, which includes along “an upper edge of the intermediate unit strips.

For the above reasons applicants’ traverse of the rejections of claims 11-12 and 14 fails to persuade.

d: On new matter: please see the rejections overhead under 35 USC 112, first paragraph, for the introduction of new matter through the current amendment of the previous claims.

e. On the new claims: Finally, on the newly included claims, Applicants’ description of claim 25 is incomplete in that the claimed “lateral support elements” are not mentioned, and neither do said “lateral support elements” correspond to any of the disclosed structural element in the text of the original specification including original claims. Furthermore, attention is drawn to the new matter introduced in said new claims (see rejections under 35 USC 112, 1st paragraph).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JOHANNES MONDT whose telephone number is (571)272-1919. The examiner can normally be reached on 8-17.

Art Unit: 3663

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jack W. Keith can be reached on 571-272-6878. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/JOHANNES MONDT/
Primary Examiner, Art Unit 3663